

## HURRICANES OF THE 1950 SEASON

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### GENERAL SUMMARY

The hurricane season of 1950 was an active one in the Atlantic. It gave 12 storms, 11 of which developed full hurricane force. Eleven is the largest number of full hurricanes reported for a season, in history. However, the record number of starts is 21, set in 1933; only 10 of these 21 storms developed into full hurricanes. One of the 11 hurricanes of 1950 developed hurricane force twice in its course with a wave stage between. In reality, it might be classed as two separate hurricanes that developed at different times from the same easterly wave, in which case the number of full hurricanes would be 12. Four of the storms entered the United States mainland and two others came close enough to give strong winds at Cape Hatteras or Cape Cod, but did not move inland. Property and crop damage in the United States was about \$35,-850,000 and 19 lives were lost. These numbers include damage of \$2,000,000 and loss of 12 lives in New England coastal areas.

The first hurricane of the 1950 season was noted August 12. Before this, the tropical Atlantic had been remarkably quiet; not even an "easterly wave" worthy of note had appeared. The August 12 hurricane was the first of a family of six that scarcely gave a break until September 16. Much of the time during this period of 37 days, there were two or three hurricanes in progress at the same time. Beginning with September 17, there ensued 14 days without hurricane formation, but on October 1, the first of another family of six storms appeared. These gave but a few days respite until October 21, when the season ended. The 70-day period from August 12 to October 21 constituted the hurricane season of 1950. It began late and ended early, but while it lasted was packed with activity seldom, if ever, before observed.

From the forecasters' point of view and the experience of airplane reconnaissance crews, the season presented more exasperation and hard work to keep track of the storms than any other year of our experience. The track chart (fig. 1) shows many slow movements, blockings, changes in course, and even loops. In addition, increases and losses of intensity of a number of the storms over short periods of time presented unusual difficulties. For example, the hurricane of September 1 to 7 made two small loops in the northeastern Gulf area and another

180° turn over Florida which gave four abrupt changes in course in 3 days [1]. The late October hurricane in the Gulf added rapid deepening and filling to an erratic course, and caused subsequently needless warnings and public anxiety on the Florida West Coast. During the last 12 hours as it approached the coast, it lost force rapidly from a hurricane of 100 m. p. h. to a storm of only moderate gale force as it moved inland in the Cedar Keys-Cross City area.

Another unusual feature that may be noted from figure 1 is the number of times two or more hurricanes were in progress simultaneously. During the period August 27 to 31, two hurricanes were in progress in the Atlantic; and from September 2 to 6, three fully developed hurricanes were noted, two in the western Atlantic and one in the Caribbean-East Gulf area. From October 1 to 5, there was a hurricane in the Atlantic and a tropical storm in the western Gulf of Mexico; again, from October 14 to 16 and on October 18-19, two hurricanes were in progress at the same time. It is not without precedent to have more than one hurricane in the Atlantic hurricane area at one time, but the writer has never seen so many twins and triplets on the map of the western Atlantic before. Two of the maps with multiple storms are reproduced in figure 2.

During this busy hurricane season the Miami Hurricane Central issued 270 advisory bulletins and coordinated many others for release by other forecast centers. The total ran well over 300. The Navy dispatched 60 reconnaissance flights into hurricanes during this period, and the Air Force made slightly more; about 130 reconnaissance flights were completed in all. This is by far the greatest number of hurricane reconnaissance missions flown during any season since this observation method was introduced in 1943. This grilling pace was exhausting to both men and machines, including those who did the reconnaissance work and those at the Central who charted the storms and issued the advices.

### INDIVIDUAL HURRICANES

*Able—August 12-21.* The first hurricane of the season was suspected on the afternoon of August 12 from general conditions several hundred miles northeast of the Leeward Islands. A reconnaissance plane located the developing

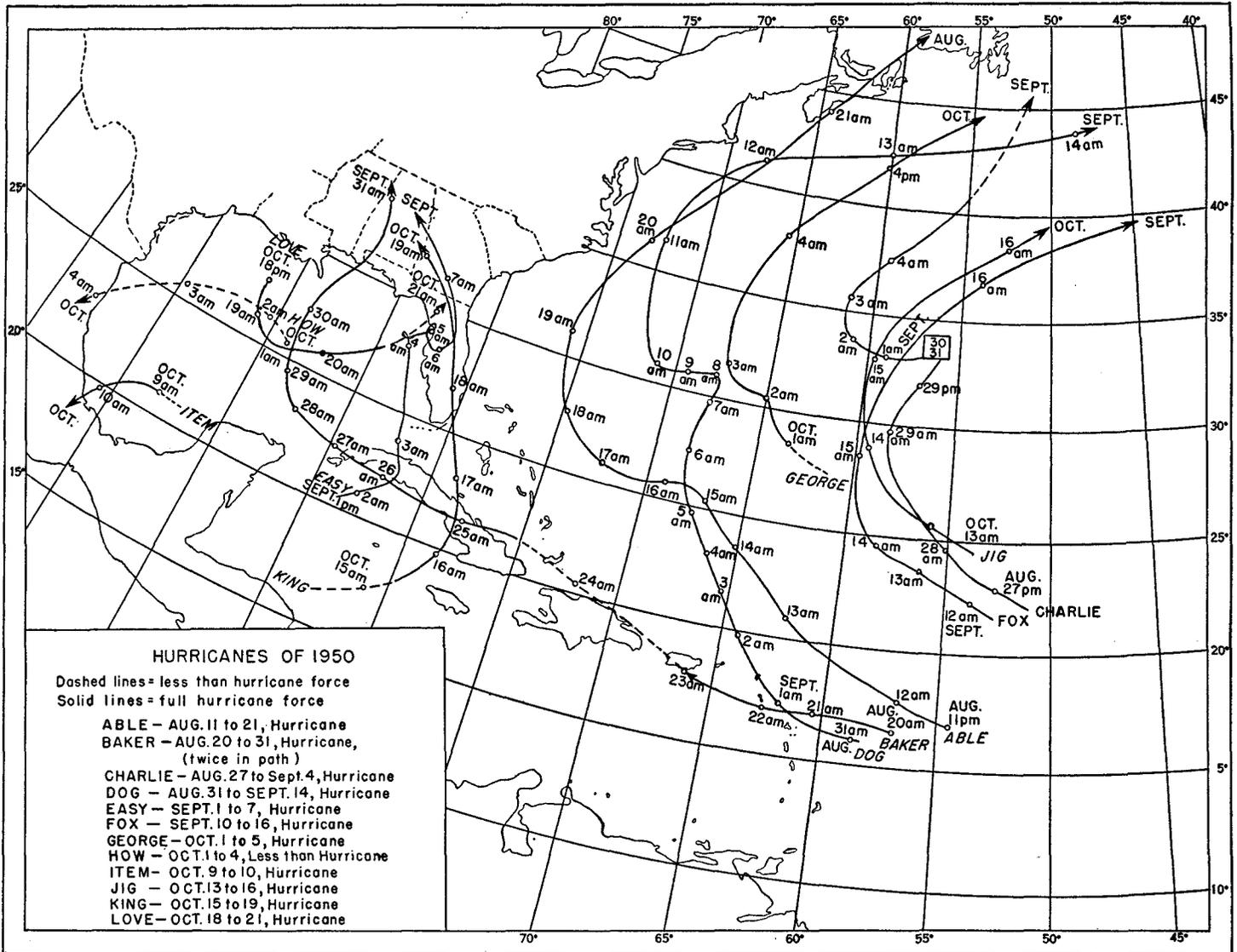


FIGURE 1.—Tracks of the Atlantic hurricanes and tropical storms of 1950 named alphabetically in chronological order. Points on the paths are identified by date and time (a. m. or p. m.) of observation.

hurricane on the morning of the 13th near 21° N., 62° W. It soon increased to hurricane force and moved slowly on a variable northwesterly course which brought the center a short distance east of Cape Hatteras during the night of the 19th, and thence northeastward into Nova Scotia on the 21st. It caused strong winds on Cape Hatteras and Cape Cod, but hurricane force was not experienced on land, except in parts of Nova Scotia. The strongest winds reported in this hurricane were about 140 miles per hour and lowest pressure about 28.15 inches (953.3 mb.) recorded by aircraft at sea.

*Baker*—August 20–31. This hurricane appeared east of the Leeward Islands on August 20. It passed about over the island of Antigua during the night of the 21st with winds reported at 90 to 120 miles per hour. It progressed slowly west-northwestward losing force, and was only a minor disturbance on the 23d when it reached

Puerto Rico, where strongest winds were 35 to 40 miles per hour. Thereafter, it was in the nature of a squally wave until the evening of the 25th when signs of another developing center were noted off the south Cuban coast. This center developed slowly, moved westward across the western tip of Cuba into the Gulf, made a curve to northward, and increased to hurricane force. Aircraft and ship reports on the afternoon of the 30th estimated strongest winds at about 115 miles per hour some distance south of the Alabama coast. This was the strongest reported in connection with this storm. It lost some force before moving inland during the night of the 30th between Mobile and Pensacola. Winds on the coast were 75 to 85 miles per hour; a total of about \$2,550,000 damage to property and crops resulted from winds and tides in a zone from near Mobile to St. Marks, Fla. There were two tornadoes reported in connection with this hurricane, one

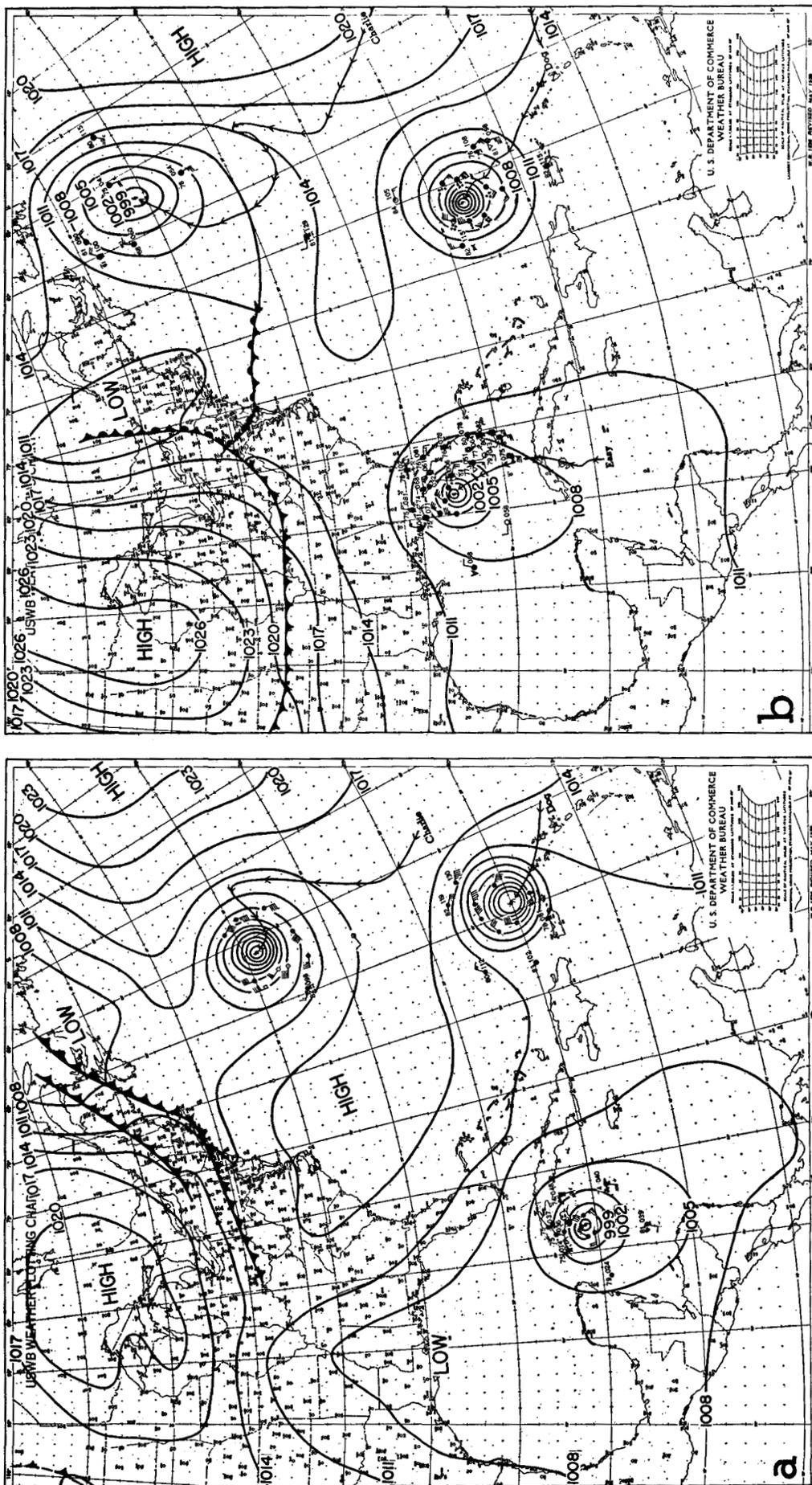


FIGURE 2.—(a) Section of surface chart for 0730 EST, September 2, 1950, showing three fully developed hurricanes, Dog, Easy, and George. (b) Chart for 0730 EST, September 4, 1950, showing the position of the same hurricanes 48 hours later.

of which demolished four dwellings and a store building, and damaged 11 other buildings at Apalachicola. The other tornado occurred in Jackson County, Fla., but only one home was destroyed. Heavy rain and winds resulted in heavy crop damage in southern Alabama and northwest Florida. Gusts of 50 miles per hour were recorded as far inland as Birmingham Airport, and were estimated as high as 75 miles per hour atop adjacent mountains. One person was killed and two injured in Birmingham by fallen live wires.

*Charlie—August 27–September 4.* This hurricane remained far out in the Atlantic during its life span. It was noted on August 27 near 23° N., and 53° W. whence it moved northwestward to about 29° N., 58° W. and recurved to the northeast. On the 30th when it had reached the vicinity of 34° N., 56° W., its progress was blocked by high pressure to the north. After becoming quasi-stationary, or perhaps making a loop in this area, it drifted very slowly westward to 34° N., 62° W. on September 2 when it resumed northward and northeastward movement and rapidly became extratropical several hundred miles southeast of Nova Scotia. Strongest winds reported in this hurricane were about 115 miles per hour recorded by aircraft.

*Dog—August 31–September 14.* This hurricane was located August 30 when the S. S. *Sibrodin* reported gale winds and falling pressure near 16.5° N., 57° W. It might have been the same storm whose beginnings were reported near the Cape Verde Islands on August 24, but there were no reports of it after it left the Cape Verde area until the *Sibrodin* reported on the 30th. It proved to be the most severe hurricane of the 1950 season, with winds estimated by aircraft at over 160 knots (184+ miles per hour) and waves 100 feet high. It moved on a northwesterly course and passed close to Antigua, Barbuda, and other islands of the northeastern Leeward group on September 1. Residents of Antigua, where highest winds were estimated at over 130 miles per hour and hurricane force lasted for 6 hours, reported it to be the most severe hurricane in the history of that island. Many homes and business houses were destroyed or damaged, crops destroyed, roads blocked by washouts and fallen trees, communications and power lines down, and many small craft wrecked. Two persons were drowned when their small boat capsized. The island of Barbuda also estimated winds of 130 miles per hour or greater, with equal or worse devastation than experienced at Antigua. Damage has been placed at over \$1,000,000 on these small islands.

The hurricane continued to move slowly on a northwesterly course after leaving the Leeward Islands and curved northward toward Bermuda, but its progress was blocked about 200 miles southwest of Bermuda near 31° N., 67.5° W. on September 8. It drifted slowly westward for 2 days before resuming a north to northeast course, and finally turned eastward south of Nova Scotia and Newfoundland on the 13–14th. It gave strong winds on Cape Cod when

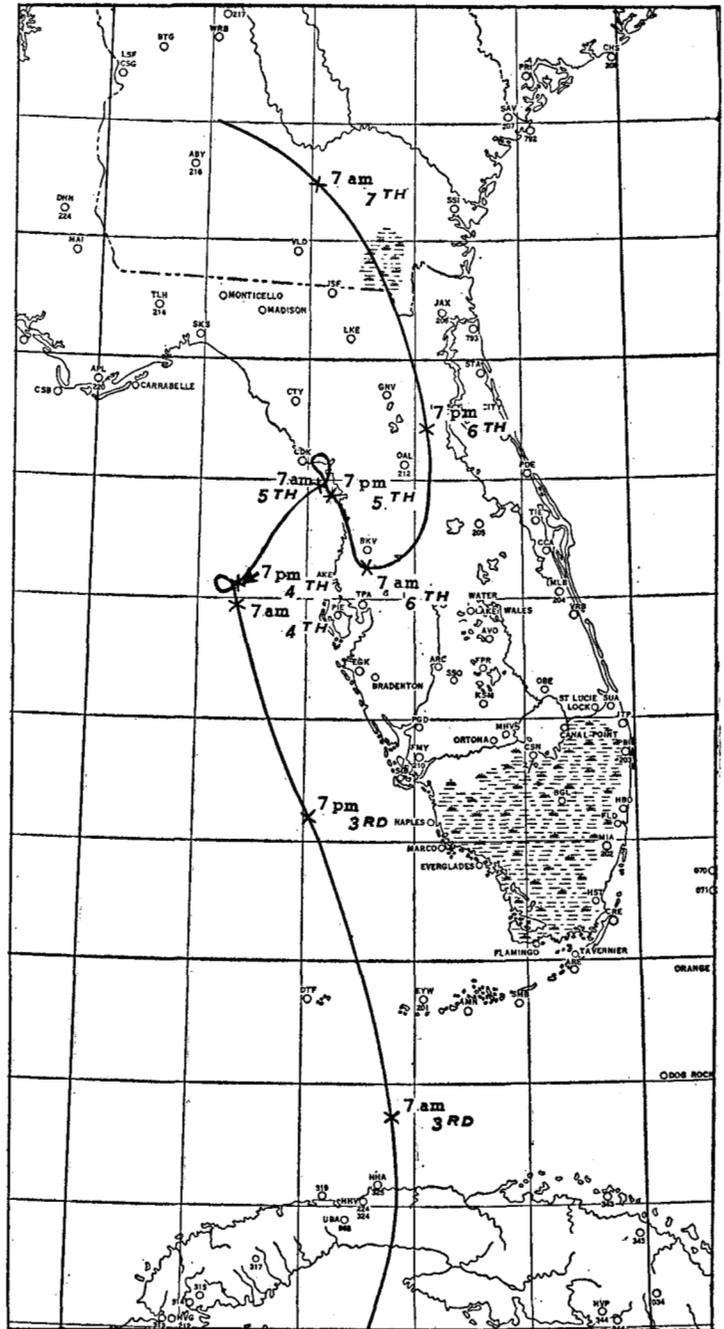


FIGURE 3.—Erratic path of hurricane Easy, September 1–7, 1950. Hourly readings from two radar sets confirm this track [1].

it was passing some distance offshore on the 12th, and the station at Nantucket reported gusts of near hurricane force. Although winds along the New England coast were less than full hurricane force, damage amounted to \$2,000,000 and 12 lives were lost, 11 in capsized boats. It was fortunate that this great hurricane remained at sea and did not seriously affect other coastal areas for it was indeed a giant of potential destruction.

*Easy—September 1–7.* Long before the Atlantic giant was out of the way, the next hurricane developed in the northwestern Caribbean Sea south of the Isle of Pines on September 1. It remained nearly stationary for 2 days,

before moving northward across Cuba near Havana. The center moved north-northwestward thereafter as a storm of just about the lower limit of hurricane force and passed between Key West and Dry Tortugas around noon of September 3 (fig. 3). It continued about parallel to the west Florida coast 30 to 50 miles offshore until it reached a point some 70 miles northwest of Tampa on the 4th. Here it described the first of two loops and started moving northeastward. The center reached the coast a short distance south of Cedar Keys the morning of the 5th, where it made another loop; in making this loop the calm center moved over the town of Cedar Keys from the southeast and then away toward the south. This gave the town the unusual experience of exposure to the same side of a hurricane twice, with  $2\frac{1}{2}$  hours of calm center between. About the time of the first loop, the intensity increased to 125 miles per hour, the strongest wind reported at Cedar Keys, but the loop described over that place resulted in hurricane force or higher from 0600 EST to 1800 EST on the 5th, except for the  $2\frac{1}{2}$  hours of calm from 1100 EST to 1330 EST. Long-time residents reported it the worst hurricane experienced at that place in more than 70 years. This fishing village of about 1,000 population was badly wrecked. Half of the houses were destroyed or rendered unfit for habitation, and 90 percent of the remainder were damaged. The fleet of fishing boats which was the principal source of livelihood for the community was completely destroyed. But the hurricane was not through with its gymnastics. It moved southward about 70 miles to a point about 30 miles north of Tampa where it turned eastward and made a rather sharp curve back to northward over Florida on the 6th. This made four abrupt changes in course in 3 days! (See fig. 3.) It had lost hurricane force by this time, however, and dissipated as it moved into southern Georgia on the 7th.

Extremely heavy rainfall occurred in connection with this storm over central and northeast Florida. Cedar Keys had 24.50 inches in 3 days while many other stations had from 10 to 20 inches of rainfall. These rains caused much flooding and some crop damage which, when added to the damage by high tide and wind on the west Florida coast, amounted to about \$3,300,000. Two persons were killed by fallen live wires and 27 others were injured in various ways. The small damage figure is due to the sparsely settled area where the worst part of the hurricane occurred. The lowest pressure reported was 28.30 inches (958.3 mb.) at Cedar Keys.

The warning service in connection with this hurricane was very good despite its erratic course; however, warnings were issued for a larger area than actually experienced hurricane winds. The extremely erratic movement, which presented the most difficult forecasting problems that we have encountered, has been discussed in detail by Gentry [1].

*Fox—September 10–16.* This hurricane was discovered by aircraft reconnaissance on September 10 near  $19^{\circ}$  N.,

$50^{\circ}$  W., or about 1,000 miles east of Puerto Rico. At that time it was a small hurricane with winds estimated at 70 to 80 miles per hour. The wind speed increased to about 140 miles per hour as it moved in a curving path toward the northwest and north during the next few days. It passed more than 300 miles east of Bermuda on the 15th, and thereafter moved rapidly northeastward over the Atlantic. This hurricane remained small throughout its course, but maintained maximum velocities of about 140 miles per hour until it moved out of range of reconnaissance.

*George—October 1–5.* A strong easterly wave was noted on September 27 over the Atlantic far to the southeast of Bermuda. It developed a large low pressure system that drifted slowly northwestward, but daily reconnaissance failed to find a storm center of strong circulation until October 1. At 0730 EST on the 1st, the S. S. *Alcoa Regasus*, about 170 miles south of Bermuda at  $29.5^{\circ}$  N.,  $64.4^{\circ}$  W., reported a southwest wind 65 miles per hour, which indicated hurricane development. An airplane later in the day found the center with highest wind about 100 miles per hour. It moved slowly northward until the morning of October 2 with a threat to Bermuda since it was only 90 to 100 miles away. It changed course, however, and swung westward far enough to miss Bermuda before resuming a northward and northeastward course. It passed south of Newfoundland on the 5th. The strongest wind reported was about 110 miles per hour on the morning of October 4 when the center was near  $39^{\circ}$  N.,  $65^{\circ}$  W.

*How—October 1–4.* A tropical storm of less than hurricane force developed in the Gulf of Mexico October 1 near  $25.5^{\circ}$  N.,  $89^{\circ}$  W. It moved on a northwest, west, and then southwest course and entered Mexico north of Tampico on the 4th. The strongest winds reported in connection with this storm were about 55 miles per hour. Squally winds of 45 to 55 miles per hour prevailed during most of its life in the Gulf of Mexico, and were confined mostly to the northern semicircle of the disturbance. This was the only disturbance of the season that did not develop hurricane force.

*Item—October 8–10.* This small hurricane began to develop on the 8th in the Gulf of Mexico northwest of the Yucatan Peninsula. On the morning of the 9th, a reconnaissance plane located the small center with 90 miles per hour winds at  $21^{\circ}$  N.,  $94^{\circ}$  W., about 200 miles northeast of Vera Cruz, Mexico. It moved southwestward and entered Mexico a short distance south of Vera Cruz on the morning of the 10th. The strongest wind reported was 110 miles per hour at Vera Cruz. Damage in Vera Cruz and vicinity was reported in the press as "heavy" but no estimate of the amount of damage or number of casualties has been received.

*Jig—October 13–16.* At 0800 EST on October 13 the S. S. *Rio Primero* reported a northeast gale wind and rapidly falling pressure at  $27^{\circ}$  N.,  $57^{\circ}$  W., which indicated that a hurricane center was in the vicinity of  $25.5^{\circ}$  N.,

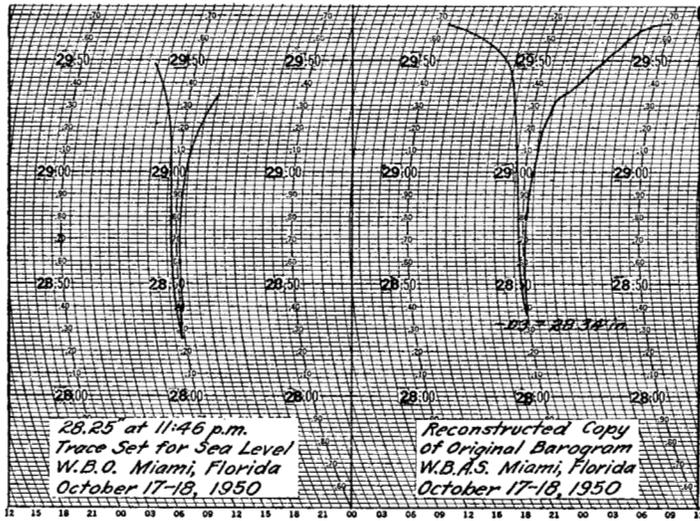


FIGURE 4.—Barogram traces for 2 recording stations in Miami, October 17-18, 1950, during passage over city of hurricane King.

56.5° W. at the time. A subsequent report at 1000 EST from the *Rio Primero* gave northwest gales and rapidly rising pressure indicating the passage of the small but sharp hurricane center nearby to the east. A plane out of Bermuda early on the 14th located the small, mature hurricane at 29° N., 59.3° W. It moved on a curving path passing 300 miles east of Bermuda during the night of October 14 and turned northeastward over the Atlantic. This was a small hurricane throughout, and strongest winds were estimated to be around 115 or 120 miles per hour.

*King—October 15-19.* This small, but violent, hurricane passed directly over the city of Miami about midnight of October 17 and caused property damage that amounted to an estimated \$15,000,000 in the city and its vicinity. Total damage for Florida in crops and property was about \$27,750,000, which, when increased by the \$250,000 damage done in Georgia, brings the grand total for this hurricane to \$28,000,000. Three persons were killed in Florida and one in Georgia, with injuries to 199 others, 16 of whom were injured seriously.

This hurricane formed in the northwestern Caribbean Sea on October 15 and moved on a northeasterly course

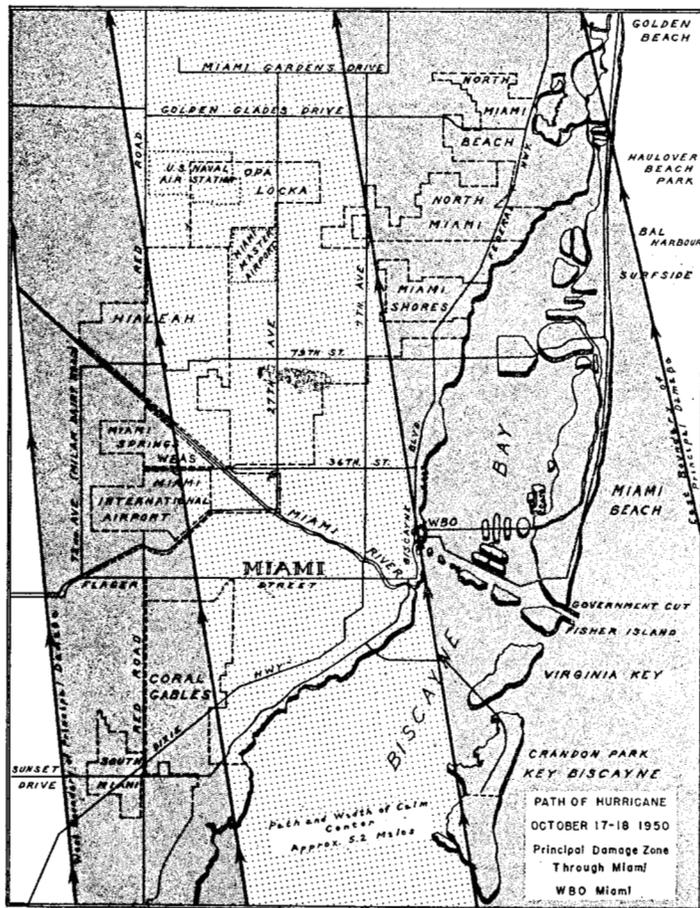


FIGURE 5.—Map showing hurricane King's path across Miami and vicinity. Darker shading indicates areas of greatest damage.

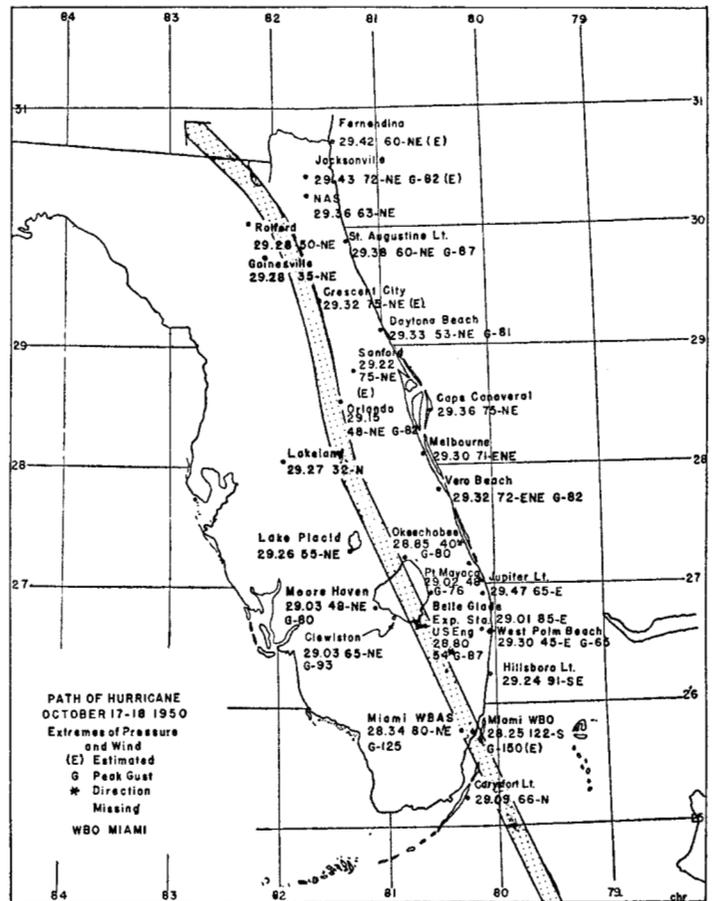


FIGURE 6.—Path of hurricane King across Florida showing pressure and wind velocity (m. p. h.) at selected points.

at first, past the western end of Jamaica, then turned northward across Cuba just west of Camaguey during the night of the 16th. It was a small hurricane at that time; strongest winds at Camaguey were only around 65 miles per hour. The course turned more to north-northwest as it moved through the Florida Straits on the 17th. A reconnaissance plane entered the "eye" at about 0900 EST on the 17th north of the Cuban coast and found strongest winds about 85 to 90 knots with some gusts estimated at 100 knots. The minimum pressure in the center at that time was 988.0 mb. (29.18 in.), and the "eye" was about 20 miles in diameter. When it reached Miami at midnight, the central pressure was 955.0 mb. (28.20 in.), and the central calm area was only about 5 miles in diameter. Maximum sustained winds had increased to 122 miles per hour with gusts of about 150 miles per hour. Thus in the period from around 0900 EST to midnight there was considerable intensification; central pressure fell 0.98 inch (33.2 mb.), the wind increased greatly, and the central "eye" contracted from 20 miles to 5 miles in diameter. The barograph traces for the two recording stations in Miami are shown in figure 4. They indicate the small, intense vortex. These stations were on the edges of the "eye," with center midway between them.

Figure 5 shows the path through the greater Miami area on an enlarged scale. The principal damage zone, which is indicated by the shaded area, was only about 14 miles wide. In this narrow strip structural damage was extensive, and it was so sharply outlined that many at first thought the damage was caused by a tornado or a series of them. In a distance of about  $\frac{1}{4}$  to  $\frac{1}{2}$  mile damage increased from light to heavy, but a careful examination immediately after the storm by experienced meteorologists failed to find evidence of tornadic action. The damage was simply that of violent hurricane winds, the most severe to visit Miami since the great hurricane that devastated the city in 1926.

There have been numerous reports of lightning and thunder in hurricane vortices, especially in the tropics, and numerous other instances of thunder in peripheral areas, but this is the first occasion observed in Florida, to this writer's knowledge, of lightning and thunder right near the center where wind velocities were 95 to 125 miles per hour. There were several brilliant lightning flashes with thunder during the height of the storm, observed by the writer, and one discharge occurred very near the Weather Bureau Office with a sharp crack of thunder heard above the deafening scream of the wind, only a few minutes before the lull occurred.

After leaving the Miami area, the center continued a north-northwesterly course, crossed over Lake Okechobee, and continued through eastern Florida into Georgia. Figure 6 shows the path of the hurricane with pressures and wind velocities at many places. Hurricane force winds in squalls extended nearly to the Georgia line, espe-

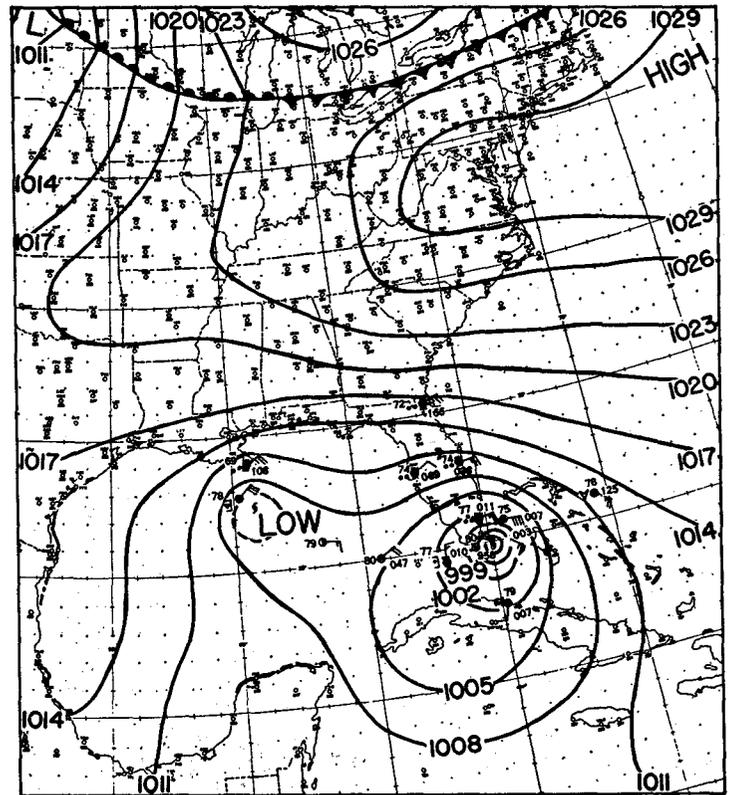


FIGURE 7.—Section of surface chart for 1930 EST October 17, 1950, showing beginning of formation of a second hurricane south of Louisiana coast in offshoot trough of low pressure from hurricane King.

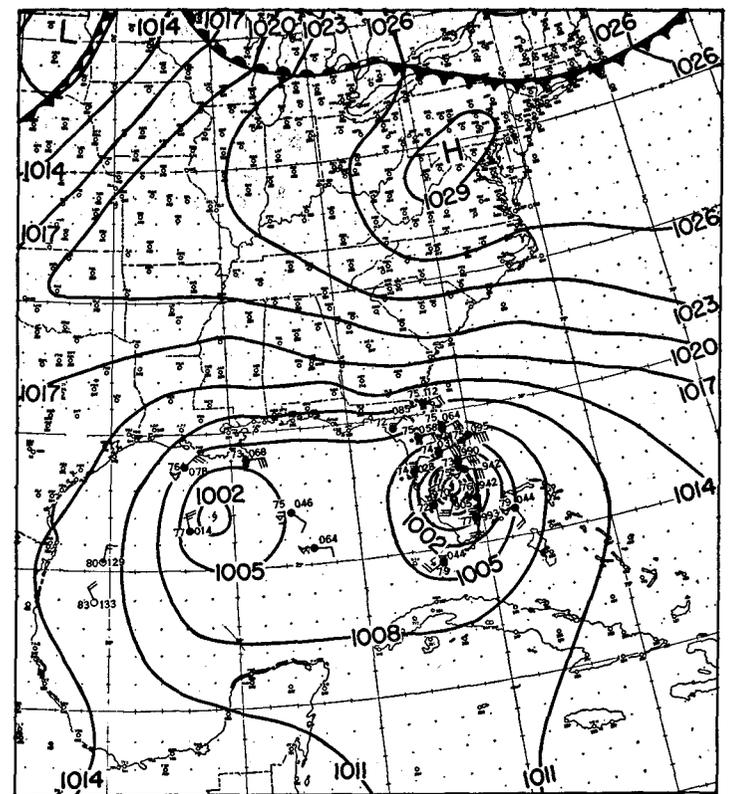


FIGURE 8.—Chart 12 hours later than figure 7 (0730 EST, October 18, 1950) showing development of second hurricane (Love).

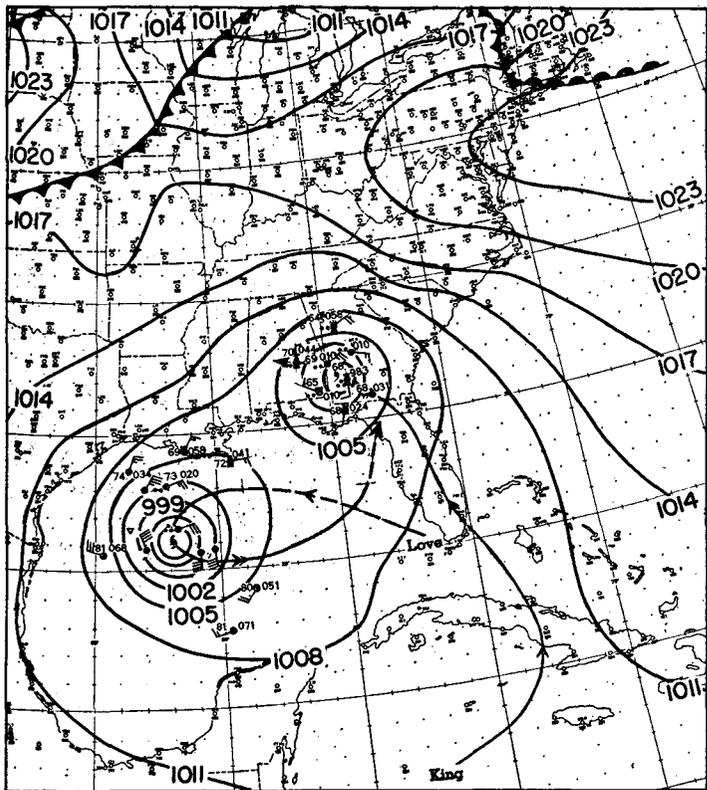


FIGURE 9.—Chart 24 hours later than figure 8 (0730 EST, October 19, 1950). Second storm (Love) is now near hurricane force while hurricane King is filling over southwestern Georgia. Tracks are inserted to indicate complete path of each.

cially along the Atlantic coast, and considerable damage resulted in all the eastern counties of Florida. Very heavy squalls extended out a considerable distance northeast of the barometric center after it reached the middle peninsula. By this time, however, the center was beginning to spread out and break up, and winds were weakening on the south and west sides.

The warning service was excellent and provided ample time for all possible hurricane preparation. This doubtless saved many lives and much property. A hurricane alert was ordered for south Florida 36 hours ahead of the storm and hurricane warnings were ordered 18 hours ahead of the hurricane winds by the Miami Hurricane Center. Despite the good warning service, many people remained complacent and failed to take adequate precautions.

This resulted in increased damage when glass windows blew out, and the interiors and contents of buildings were damaged by rainwater.

*Love—October 18–21.* The last hurricane of this most trying season certainly belied its romantic designation. It was more bewildering and exasperating, if possible, than the others of the season's disturbances. It began forming in the Gulf of Mexico south of the Louisiana coast at the time the severe hurricane was moving northward through Florida on the 18th, and in some respects was an "offshoot" of it. (See figs. 7, 8, and 9.) As the Florida hurricane was moving north-northwestward from the Caribbean Sea, an elongation of low pressure extended ahead of it over Florida. As the hurricane progressed this pressure trough moved northwest and west, with a tendency to move counter-clockwise around the hurricane. On the 18th (fig. 8) it developed a center of circulation of its own south of the Louisiana coast. This center continued its counter-clockwise movement and swung down into the central Gulf on the 19th (fig. 9) and increased to hurricane force. On the 20th, aircraft reported maximum winds of 75 to 85 knots (85 to 98 miles per hour), especially in the northeastern quadrants. The movement by this time had completed the swing to the east and northeast, which caused it to offer a threat of hurricane winds to the upper west Florida coast. During the night of the 20th, however, it lost force rapidly, apparently due to dry air having completely encircled the center, and when it reached the coast on the early morning of the 21st, winds were of only moderate gale force. The presence of dry air from the West Gulf States had been noted on its western side since the time of its development, but it continued to increase in force, despite this, until the dry air had worked its way around to the south and east of the center. When this stage was reached, the loss of intensity was rapid.

#### REFERENCES

1. R. C. Gentry, "Forecasting the Formation and Movements of the Cedar Keys Hurricane, September 1–7, 1950," *Monthly Weather Review*, vol. 79, 1951 (to be published). Paper presented at meeting of American Meteorological Society, at Tallahassee, Fla., December 6, 1950.